

Addendum to the
1997 Final Environmental
Impact Statement

For the 2000 Update to the
Seattle City Light
Strategic Resources Assessment

August, 2000
Seattle City Light

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Summary

This document is an Addendum to the Final Environmental Impact Statement (May, 1997) for Seattle City Light's Strategic Resources Assessment (April, 1997).

Seattle City Light (SCL) periodically reviews developments in the energy resources markets and its energy resource acquisition policies to determine how SCL can best continue to meet its goals of supplying low cost, reliable electricity in an environmentally responsible way. During the last review, SCL issued two documents: a Draft Strategic Resources Assessment (Draft SRA) in April, 1996, and a Final Strategic Resources Assessment (Final SRA) in April, 1997. Two environmental review documents were prepared, the Draft (April 1996) and Final (May 1997) Environmental Impact Statements (DEIS and FEIS).

At the time these documents were prepared, SCL planned to revise them periodically. The first revision, the 2000 SRA, has recently been completed, and this document is the first addendum to the SRA FEIS.

The goal of the 2000 SRA is to reexamine issues analyzed in the 1997 SRA and, in some cases, to extend the analysis. In some areas the 2000 SRA recommends a different level of acquisition of a resource, or different strategic use of a resource, than recommended in the 1997 SRA, but in all cases the impacts of the recommendations fall within the impacts analyzed for the range of options addressed in the 1997 SRA and FEIS.

The original EIS documents covered a wide range of resource and policy options, and addressed environmental impacts and mitigation for those resources. The goal of the EIS was to cover a broad range of alternatives so that there would be a strong base of environmental review for future analysis, such as the 2000 SRA.

The 2000 SRA is non-project specific, and is generic in nature. Additional project and site specific environmental review may be performed, as necessary, for specific projects and resource acquisitions.

The 2000 SRA revisits the following issues from the 1997 SRA: level of purchases from BPA, whether to acquire the output from a natural gas-fired combustion turbine, level of market purchases, and the use of conservation, renewable, and load management resources. Additional information is provided about several resource types that were not reviewed in detail in the 1997 SRA or EIS: landfill and wastewater gas, biomass, and solar photovoltaic (PV) energy. These resources are now considered as viable options in the 2000 SRA, and are analyzed in more detail in the EIS Addendum.

Impacts associated with the 2000 SRA recommendations fall within the range described in the 1997 SRA EIS.

1.0 INTRODUCTION

1.1 Purpose

This document is an addendum to the Final Environmental Impact Statement (FEIS), May 1997, issued by the Seattle City Light Department (SCL) for its Strategic Resources Assessment (SRA), April, 1997. This addendum provides information on the environmental impacts associated with the 2000 Strategic Resources Assessment (SRA), August 2000.

The SRA Draft Environmental Impact Statement (DEIS) was issued in April 1996 to accompany the Draft SRA. The Draft EIS stated that "SCL intends that this EIS will remain valid for several iterations of the SRA process. Changes in the alternatives to be considered or likely significant impacts would be addressed by supplements or addenda to this EIS, as appropriate." (page S-1, DEIS)

City Light has determined that the new information described in this addendum does not involve any probable significant adverse impacts that are beyond the range of the alternatives and impacts discussed in the Final EIS. Consequently, a supplemental EIS addressing this new information is not necessary under the State Environmental Policy Act (SEPA), and the Final EIS for the Strategic Resources Assessment is adopted by reference in this addendum. City Light believes, however, that further public and agency review of the information in this addendum is desirable for a more complete understanding of the issues, impacts, and mitigation measures associated with the project. SEPA allows the use of an addendum to accomplish this purpose (WAC 197-11-600 (4) (c)).

A notice of the addendum's availability will be sent to all recipients of the Final EIS for the SRA. There will be a 15 day comment period starting August 17, 2000, the date of the issuance of the addendum. Comments on the addendum may be sent by August 31, 2000, to:

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Readers with questions about the addendum may call Corinne Grande, Power Analyst, Seattle City Light Environment and Safety Division at (206) 386-4517. As a back up contact person, call Lynn Best, Manager, Science Policy, Environment and Safety Division, at (206) 386-4586.

1.2 Project Background

In May, 1996, SCL issued its Draft SRA. The Draft SRA described SCL's analytical tools, planning process, policy options and goals for resource acquisition. It focused on four areas in which SCL could choose various options to meet resource needs: the amount of energy to purchase from the Bonneville Power Administration (BPA), level of energy conservation goals, whether to acquire the output of a natural gas-fired resource, and whether to use quantified environmental externalities in resource planning. The SRA DEIS was issued in April, 1996.

In April, 1997, SCL issued the Final SRA. The Final SRA included additional analysis of the four policy options discussed in the Draft SRA, as well as analysis of a new option: acquisition of green resources. The SRA Final EIS was issued in May, 1997.

In the Draft SRA EIS, page S-1, updates to the SRA were anticipated: "SCL expects to revise the SRA periodically to account for changed circumstances and new information."

The 2000 SRA recommendations were submitted to the Seattle City Council on August 3, 2000.

2.0 STRATEGIC RESOURCES ASSESSMENT UPDATE ISSUES AND PRELIMINARY RECOMMENDATIONS

2.1 Key Findings

The 2000 SRA analysis resulted in several key findings. One, SCL load growth is high and is increasing. Second, market prices today are higher and more volatile than had been projected in the 1997 SRA. Third, there is a considerable risk associated with having a large energy deficit and having to rely on the market. SCL has sold the Centralia coal plant and several power purchase contracts will expire by 2006, leaving fewer resources to serve larger loads. The seasonal shape of market prices has also changed significantly, with late summer and fall energy becoming increasingly expensive.

SCL resources load and forecasts have been updated. The load growth projection in the 2000 SRA is higher than the base case described in the SRA EIS, due to projected strong economic growth and a relatively new phenomena of high technology companies with very large loads expanding in or moving to SCL's service territory. While there is uncertainty about the timing and size of these loads, they will increase the demand on SCL's resources. Load variability between seasons is also considered in the SRA recommendations. Because the load growth projection is within the high range analyzed in the EIS, it does not require additional analysis here.

The types of resources in the 2000 SRA are the same as those described in the SRA EIS. The EIS includes descriptions of changes in contracts and potential sale or closure of resources. An update on the sale of the Centralia Coal Plant is included in this addendum; an analysis of the impacts of the sale was included in the EIS. More details are provided in this addendum for landfill and wastewater treatment gas, biomass, and solar energy resources.

2.2 Recommendations

Based upon the key findings from the analysis, several recommendations are made in the 2000 SRA. These recommendations involve issues similar to those in the 1997 SRA. In some cases the recommendations have changed, but the recommendations and impacts are within the range of options described in 1997 SRA and EIS. Since the current recommendation includes an increase in the level of conservation and renewable resources compared to the 1997 SRA recommendations, impacts will be lower, as there will be less need to rely on fossil fuel based resource options such as market purchases.

Consistent with Seattle City Council direction in the Earth Day Resolution passed in the spring of 2000, the utility intends to meet its load growth with cost effective conservation and renewable resources. This load growth is currently projected to be 200 aMW over the 2001-2011 timeframe.

- **Conservation:**
Double the conservation target to 12 aMW, per year, over the ten year period to meet roughly half this load growth.
- **Renewables:**
Strive to contract for roughly 100 aMW of renewable resources.

The exact contributions of conservation and renewable resources are unknown at this time. If fossil fuels are needed to meet load growth, the greenhouse gas emissions from the production of electricity will be mitigated.

- **BPA Purchases:**
SCL should sign contracts with BPA to purchase our full entitlement to federal power – approximately 569 aMW firm energy in 2011
- **Non-BPA Resources:**
Negotiate to purchase roughly 100 MW of power from a mitigated (for CO₂) combustion turbine (CT).
- **Financial Policies:**
Create a work plan to review and revise financial policies.
Amend City Light's rate ordinance to contract with new large load customers.
- **Load management:**
Review load management strategies and recommend changes if appropriate.
- **Greenhouse gas mitigation:**
Develop policies to guide greenhouse gas mitigation strategies to the extent fossil fuels are used to meet load growth.

2.3 Impacts of 2000 Recommendation

The 2000 SRA Recommendation will have lower air quality impacts than the 1997 SRA Preferred recommendation (see SRA FEIS, page 5-4 and 5-5), as well as larger beneficial economic impacts. A summary of impact levels for the various environmental review categories is shown in Figure 2-1.

The 1997 SRA Preferred Recommendation included the following:

- BPA – 195 aMW (1996 Contract Amendment)
- Conservation at 6 aMW per year from 1997 – 2000
- CT – do not acquire the output of a CT immediately, continue to evaluate options
- Renewables – continue to evaluate cost-effective options
- *Centralia – assumed continued ownership of share, averaging 81 aMW
- Reliance on market purchase for remaining energy needs.

The 2000 SRA recommendations are:

- BPA – Full Entitlement – up to 569 aMW firm energy in 2011
- Conservation – Double conservation goal to 12 aMW over ten-year period
- CT – purchase roughly 100 MW from a mitigated (for CO₂) CT
- Renewables – strive to contract for up to 100 aMW of renewables
- *Centralia – SCL has sold its ownership share

The 2000 SRA Recommendations include several changes that result in lower regional air impacts compared to the 1997 Recommendations. Increasing conservation and renewables will decrease use of fossil-fueled resources, such as market purchases. Purchasing energy from a CT will result in less use of market energy, and new CTs have lower air emissions than the mix of fossil resources on the market (see 3.1). Also, green house gas mitigation will reduce impacts further. Positive economic impacts are a result of increased conservation efforts, which provide local employment opportunities.

For those environmental elements whose ranking is based in part on quantified estimates of impacts of environmental measures (air quality, surface and groundwater, soils and geology, land use, and energy resources, uncertainty exists regarding the various assumptions used in SCL's modeling of electricity consumption patterns.

Figure 2.1: Comparison of Environmental Impacts: 1997 and 2000 SRA Recommendations

		Environmental Elements									
Recommendation		Air Quality	Surface and Groundwater	Soils and Geology	Plants and Animals	Land Use	Employment	Aesthetics and Recreation	Environ. Health, Including Noise	Cultural and Historical Resources	Energy Resources
1997 SRA Recommendation		High	High-Moderate	Moderate	Moderate	Low					
2000 SRA Recommendation		High	High-Moderate	Moderate	Moderate	Beneficial					
Relative impact level:		High	High-Moderate	Moderate	Low						

3.0 STRATEGIC RESOURCES ASSESSMENT UPDATE CONTEXT WITHIN 1997 SRA EIS:

3.1 BPA and Market Purchases and Surplus Sales to Market

The SRA EIS concluded that purchases from BPA and the market should be considered to have the same environmental impacts, from a regional perspective. Increasing our purchase from BPA has the net effect of either causing BPA to increase purchases from the market to satisfy its obligation to meet customer demand or causing another buyer who would have purchased that BPA power to purchase from the market instead. So, from an environmental perspective, the regional environmental impacts of buying from BPA are equivalent to buying from the market. If SCL has surplus energy to sell to the market, that will offset, from a regional perspective, our purchases from the market or BPA at other times. So, the net impact can be determined by adding market and BPA purchases, then subtracting surplus sales: 'Market + BPA - Sales = Net Impact'. The environmental impacts of BPA and market purchases, and the offsets from surplus sales to the market, were described in Chapter 8 of the EIS as being associated with the fossil fuel generation that serves the western energy market. Both sources are assumed to be supplied primarily by existing fossil fuel resources, including coal and natural-gas fired boilers and natural gas fired CTs.

The 2000 SRA recommendation results in a combination of BPA and market purchases and surplus sales that is within the range of options considered in the SRA DEIS. The 1997 SRA considered the option of reduced purchases from BPA, but due to changes in market conditions, SCL is now considering increasing BPA purchases to the maximum entitlement. Impacts from increases and decreases in BPA purchase levels are described in the SRA DEIS in Chapter 5, Alternative Resource Portfolios, and Chapter 6, Environmental Impacts of and Mitigation for Alternative Resource Portfolios.

In the Alternative Resource Portfolios, SRA DEIS Chapter 5, BPA purchase levels, projected for the year 2010, ranged from 10 MW in the "BPA Independence" portfolio to up to 475 MW in the "Status Quo" portfolio. The Status Quo Portfolio included 357 aMW of BPA and 104 aMW of market purchases in 2010. The 2000 SRA recommendation is that SCL purchase up to its full BPA entitlement, up to 569 aMW in 2011. It is estimated that this results in an average energy purchase of up to 629 aMW. This BPA purchase combined with the resulting reduction in market purchase and increase in surplus sales, is within the range of market/BPA changes covered by the Status Quo alternative. The environmental impacts and mitigation for these alternatives are described in Chapter 6 of the SRA DEIS.

3.2 Non-BPA Resources

In the 2000 SRA, the "Non-BPA Resource" is a new natural gas-fired combustion turbine (CT), either simple or combined cycle, that SCL would own or buy the output on contract. 1997 SRA analyzed a "Gas-Fired Dispatchable Resource", also a natural gas combustion turbine.

The amount of energy to be acquired from a CT was not specified in the 1997 SRA. Instead, the recommendation was more general: SCL should consider acquiring the output of CT. However, the 1997 SRA DEIS analysis of Alternative Portfolios, in Chapter 5, includes a broad range of levels of CT acquisition, including likely levels of future SCL purchase from a simple or combined cycle combustion turbine.

The impacts of generic gas-fired resources were also described in the SRA DEIS Chapter 4, as being low to moderate in each resource category. Impacts from increases in SCL's use of gas-fired resources are also described in the SRA DEIS, Chapter 8, Environmental Impacts of and Mitigation for Alternative SRA Recommendations.

The 2000 SRA recommendation for CT acquisition is within the range analyzed in the SRA EIS, 30-335 aMW (year 2010).

3.3 Transmission

Environmental impacts from the construction or expansion of transmission lines were analyzed in the SRA DEIS in Chapter 4, Environmental Impacts of and Mitigation for Alternative Energy Resources.

3.4 Renewables

The 2000 SRA considers the following renewable resources: geothermal, wind, solar, small hydro, biomass, and landfill and wastewater treatment gas. The recommendation for renewables is to strive to contract for 100aMW of renewable energy.

Three of the resources, wind, small hydro and geothermal, were addressed in the SRA DEIS in Chapter 4. The impacts of a generic geothermal project are described as low to high-moderate in the various resource categories. The impacts of a generic wind and small hydro projects are described as low or moderate in each of the resource categories. The 2000 SRA recommendation falls within the generic range of wind, small hydro, and geothermal projects analyzed in the SRA DEIS.

The other renewable resources discussed in the 2000 SRA, landfill and wastewater treatment gas, biomass, and solar, were discussed in Chapter 3 of the SRA DEIS, Description of Alternative Resources, but not considered as viable alternatives because of costs. The environmental impacts and mitigation for landfill gas and solar are described in detail in this Addendum. The following analysis of solar and landfill gas only adds information and does not substantially change the conclusion about the impact of these alternative resources. The Update recommendations for renewable resources falls within the range of options analyzed in the EIS, with additional information in this addendum.

3.5 Conservation

The SRA DEIS evaluated the environmental impacts of various conservation methods and levels, in Chapter 5, Description of Alternative Resource Portfolios, and Chapter 6, Environmental Impacts and Mitigation for Alternative Resource Portfolios. The conclusion was that increased

fossil-fuel generation would result if conservation levels decreased, with the associated environmental impacts of fossil fuel resources. If conservation levels increased, there would be a corresponding decrease in environmental impacts, particularly to air quality.

The 2000 SRA conservation recommendation is based on the results of the recent Conservation Potential Assessment, but does not specify specific types of conservation methods. The impacts of various conservation measures likely to be used were analyzed in the SRA DEIS. Impacts from general types of conservation measures themselves were described in Chapter 4 as being generally low.

The general recommendations about the use of conservation in the 2000 SRA do not introduce any new conservation methods nor are they likely to result in any significant changes to the levels of conservation that were not addressed in the EIS, so they fall within the range of options considered in the EIS.

3.6 Load management

The 2000 SRA includes analysis of load management, and recommends that a peak load management program be developed, including conservation, load shedding (also known as interruptible load) load shifting, and direct price signals to customers. Price signals, in which electricity would be priced based on the time of use so that peak hours which are the most expensive to serve are most costly to the customers, would have the effect of encouraging customers to conserve or shift loads to non-peak hours. Interruptible load, in which customers voluntarily agree to curtail load during defined peak load conditions, could have two overall results: increasing "conservation" if customers simply did not use the energy they would have during the peak period at all, or load shifting to another time period. So, the ultimate result of the listed load management techniques is equivalent to conservation or interruptible load.

Environmental impacts of conservation were discussed in the SRA DEIS. Considered as a generic resource in Chapter 4, Environmental Impacts of and Mitigation for Alternative Energy Resources, conservation was determined to have very low or no adverse environmental impacts.

Interruptible load was also analyzed as a resource in the SRA EIS, Chapter 4, Environmental Impacts of and Mitigation for Alternative Energy Resources. The conclusion was that interruptible load had very low or no adverse environmental impacts.

These load management methods were included in the SRA EIS and do not require additional analysis here.

3.7 Distributed Resources

The 2000 SRA recommends considering acquisition of distributed resources but does not specify an amount or a technology. Distributed resources include a wide variety of technologies and associated impacts, such as fuel cells, solar PV, and natural gas-fired microturbines.

Generic fuel cells and natural gas-fired resources were discussed in the SRA DEIS. The 2000 SRA does not recommend a specific project or amount of these resources, but suggests that they be considered for SCL's resource portfolio. Potential environmental impacts of fuel cells, described in the SRA DEIS, Chapter 4, Environmental Impacts of and Mitigation for Alternative Energy Resources, were determined to be low to moderate, depending on the fuel used. The detailed analysis of the environmental impacts of solar PV is presented in this addendum.

3.8 Resource Portfolios

In developing the SRA recommendation, several resource portfolios were analyzed. The portfolios differ in the amount and type of BPA products, whether to purchase 100 aMW from a natural gas fired combustion turbine (CT), level of purchases of energy from the market, and level of surplus sales into the market. Place holder amounts were used for conservation and renewables.

Because the environmental impacts of the BPA products are the same (see Section 3.1), from an environmental perspective, the impacts of the portfolios are differentiated by the amount of energy purchased from a CT. If SCL purchases the output from a CT, it will reduce its net reliance on market purchases (and/or increase sales). The portfolios are categorized into two general types: with and without 100 aMW from a CT.

SCL assigns a higher environmental externality cost to market and BPA purchases than to a CT. It is assumed that the fossil fuel resources serving the western energy market include a small amount of new efficient natural gas combustion turbines, as well as older less efficient combustion turbines and gas-steam and coal plants. It is also assumed that if SCL enters into a CT contract, that CT would be an efficient turbine, with significantly lower environmental impacts than the fossil fired market resources.

4.0 DESCRIPTION OF ALTERNATIVE ENERGY RESOURCES

Resources that were considered in the SRA Draft EIS, but not examined in detail, are being considered in the 2000 SRA.

4.1 Landfill and Wastewater Treatment Gas

One resource being considered again is landfill and wastewater treatment gas. From the SRA Draft EIS, April 1996, Section 3.3 Energy Resources Not Considered, page 3-17, the conclusion was made that landfill gas was "...not economically competitive with alternative energy sources." Since that assessment was made, several landfill gas projects have been completed in the northwest and are operating at costs that are significantly less than other alternative resources, such as recent wind projects in Oregon and Wyoming. There still may be opportunities for SCL to acquire output from landfill/wastewater gas projects at these competitive rates.

Using landfill or wastewater gas provides a positive environmental impact by reducing the amount of methane, a potent greenhouse gas, that would otherwise be released to the atmosphere. It also produces useful energy instead of waste heat that would be produced by flaring. Landfills are required to flare methane to reduce explosion hazard but do not capture all the methane. Energy production encourages use of as much landfill methane as can be captured.

4.2 Solar PV – Distributed and Central Station

Another resource that is under consideration in the 2000 SRA is solar energy. In the SRA Draft EIS, April 1996, page 3-17, solar was "...not considered further by SCL because of relatively high costs compared to other resource alternatives and the low solar insolation in the Northwest." While there has not been a cost-effective central station solar PV project constructed in the NW region since that report, several utilities in other parts of the country, with higher insolation levels and higher energy prices, have started programs for distributed solar on residential and public buildings. It may be possible for SCL to participate in an exchange with one of these utilities, potentially resulting in the installation of new solar PV modules outside the NW. SCL has also installed a small solar PV system at the Seattle Center as a pilot program, and may install additional units in the future.

4.3 Biomass

General biomass projects are also being considered in the 2000 SRA. While biomass projects were determined to be too costly for further analysis in the last SRA, they will be considered in this process, to capture changes in economics. Biomass energy generation can be based on a number of organic fuels that are available on a renewable basis, such as forest residues, wood products residues, agricultural field residues, and forest crops grown for fuels. The sustainability of the fuel is a critical issue in determining whether a biomass project is renewable, and what its environmental impacts are. So, SCL should evaluate the fuel stream of any potential biomass project carefully. These fuels can be converted to liquid or gaseous form and then can be used in a variety of generating equipment, such as a combustion turbine, fuel cell, or internal combustion engine.

5.0 ENVIRONMENTAL IMPACTS OF AND MITIGATION FOR ALTERNATIVE ENERGY RESOURCES

5.1 Landfill/Wastewater Treatment Gas

Figure 5-1. Potential Environmental Impacts – Landfill/Wastewater Gas





Air Quality	Surface and Groundwater	Soils and Geology	Plants and Animals	Land Use	Employment	Aesthetics and Recreation	Environ. Health, Including Noise	Cultural and Historical Resources	Energy Resources
MITIGATION									
Air quality permits		Erosion Control, Avoid building in undisturbed areas	Avoid building in undisturbed areas				Air quality permits, low emission engines, ventilate, methane detectors, fire training and equip.		
Relative impact level:  High  High-Moderate  Moderate  Low									

Figure 5-1 shows the potential environmental impacts of landfill/wastewater gas energy production, along with associated mitigation measures.

5.1.1 Air Quality

Air quality impacts from the conversion of landfill/wastewater methane gas to energy through combustion engine include the production of oxides of nitrogen, carbon monoxide, carbon dioxide, and non-methane hydrocarbons. The amount of emission depends on the type of engine. During construction, air emissions could include fugitive dust and vehicle exhaust. Air quality impacts could be reduced by using modern, low emission engines and controlling fugitive dust during construction. Meeting air quality standards also reduces air impacts.

There are some positive air quality impacts resulting from using methane to produce electricity. Methane is produced by anaerobic digestion in landfills and wastewater treatment facilities, regardless of whether these gases are used for energy. If the gas is not used for energy, it is either flared to reduce explosion danger, or released into the atmosphere. Methane is a potent greenhouse gas, and if it is used for electricity, more will be extracted from the landfill/wastewater treatment facility and not released into the atmosphere. Carbon dioxide is produced in the combustion process, either through flaring or energy production, but methane is 21 times as potent as a greenhouse gas as CO₂, so the overall greenhouse gas impact is positive with energy production.

5.1.2 Surface and Groundwater

Since they are built at existing landfill and wastewater treatment facility sites, landfill/wastewater gas to energy installations do not have significant additional impact on surface or groundwater. Existing landfills and wastewater treatment facilities may have impacts on water associated with runoff and leaching of hazardous materials in the landfill or treated wastewater that is returned to nearby water bodies. However, modern facilities typically include mitigation and controls for runoff, and water quality standards are followed. Combustion engines will use small amounts of water for cooling and engine fluids may pose a spill hazard. The risk of spills can be reduced by taking spill prevention measures.

5.1.3 Soils and Geology

Landfill and wastewater gas to energy installations do not have a significant additional impact on soil or geology, since they are built in existing facilities. It may be necessary to level the site for the energy conversion facilities or build additional buildings at an existing site. Soil might be used from the site or could be brought in from off site if necessary. Soil may be disturbed if new power lines have to be installed at the site, but the impact will be minor. Impacts could be reduced by taking erosion control measures.

5.1.4 Plants and Animals

Landfill and wastewater treatment gas to energy installations have few additional environmental impacts to plants and animals. Since they are installed in existing facilities, they generally do not increase disturbance of plant or animal life. Air and noise emissions may have a negative impact on some species, but noise levels from landfill to energy conversion are usually not increased over the level already existing from landfill and wastewater treatment operation. Impacts can be reduced by building in areas already disturbed by the landfill and wastewater treatment facilities and by incorporating noise reduction strategies into the electricity production facilities.

5.1.5 Land Use

Since landfill and wastewater treatment gas projects are built in existing facilities, no change to land use will be needed while the landfill or wastewater treatment facility is in use. However, landfill gas recovery can continue for ten or more years after the landfill has ceased collecting waste. This could prevent the land from being converted to another non-landfill use while the remaining methane is extracted. How long the methane recovery continues would depend on the comparison of costs for continued recovery to costs of alternate resources. The land use impact would be considered moderate.

5.1.6 Employment

Employment will increase during the installation of the landfill or wastewater treatment gas facility as workers create the pipeline system for extracting methane from the landfill or wastewater treatment facility and install the engines. The level of employment will depend on the size of the energy production facilities, but will be short term. It is likely that at least one full

time operator would be required for the facility, with maintenance personnel coming to the site as needed. Employment impacts will be low.

5.1.7 Aesthetics and Recreation

Aesthetics of the sites for landfill and wastewater treatment gas-to-energy facilities have already been impacted by the existing facilities. Landfills and wastewater treatment facilities have both negative visual and odor impacts. Adding an energy production facility to an area already disturbed by the landfill or wastewater treatment facility will have a low additional negative visual impact, and may have a positive impact on odor since the energy production process extracts and consumes more methane and other gases than would otherwise be flared. Visual impacts of the energy facility buildings could be reduced by limiting their size and careful selection of location to minimize visibility from off site. If new transmission lines are required, they may have visual impacts. Energy facilities would have low additional impact to recreation activities near the existing facilities. Overall, aesthetic and recreation impacts would be low.

5.1.8 Environmental Health

Environmental health issues associated with landfill and wastewater treatment gas energy facilities include air impacts, noise impacts, explosion hazard from the methane and other digestion gases, hazardous materials in the landfill coming to the surface through the piping system, and hazardous materials in the wastewater.

Air quality impacts would be limited by the conditions of the permits required for operation and could be further reduced by using modern, low emission generators.

Proper ventilation and methane sensors, and fire suppression equipment and training for facility operators, would reduce explosion and fire hazard. Public access to the facility should be limited.

Noise impacts could be reduced by using modern generators, and housing parts of the system in buildings with noise suppression features. However, noise impacts would be minor compared to landfill operation. Overall, environmental health impacts of a landfill or wastewater treatment gas energy facility would be moderate.

5.1.9 Cultural Resources

If a landfill or wastewater treatment facility is on an existing site, the gas to energy facility will have no additional impact on cultural resources. If undisturbed areas are used for the facility, cultural resources could be encountered during construction, but the impact could be minimized by consulting with appropriate agencies and stakeholder groups to identify sites which may have cultural resources. Based on this information, sensitive sites might be avoided, or site preparation overseen by a cultural resources specialist to mitigate or avoid impacts. Careful preparation of the site and handling of any cultural artifacts found during construction will also minimize impacts.

5.1.10 Energy Resources

The landfill or wastewater treatment gas energy facility would be a producer of electricity, and would consume an energy resource that would otherwise be flared and turned into waste heat or allowed to escape into the atmosphere. It would have no impact on other energy resources, except as the electricity produced would displace other sources, most likely fossil fuels.

5.2 Solar PV – Distributed and Central Station

Figure 5-2 (a). Potential Environmental Impacts – Solar PV – Central Station









Air Quality	Surface and Groundwater	Soils and Geology	Plants and Animals	Land Use	Employment	Aesthetics and Recreation	Environ. Health, Including Noise	Cultural and Historical Resources	Energy Resources
MITIGATION									
		Erosion Control, Avoid building in undisturbed areas	Avoid building in undisturbed areas	Siting to avoid areas of env. or other value		Proper siting, screening	Proper handling, storage, disposal of hazardous materials	Avoid construction in areas with cultural and historic resources	
Relative impact level:  High  High-Moderate  Moderate  Low									

Figure 5-2 (b). Potential Environmental Impacts – Solar PV – Distributed

Air Quality	Surface and Groundwater	Soils and Geology	Plants and Animals	Land Use	Employment	Aesthetics and Recreation	Environ. Health, Including Noise	Cultural and Historical Resources	Energy Resources
MITIGATION									
		Erosion Control, Avoid building in undisturbed areas	Avoid building in undisturbed areas			Proper siting, screening	Proper handling, storage, disposal of hazardous materials	Avoid construction in areas with cultural and historic resources	
Relative impact level:  High  High-Moderate  Moderate  Low									

Figures 5-2 (a) and (b) show the potential environmental impacts of solar PV energy production, along with associated mitigation measures.

5.2.1 Air Quality

Air quality impacts for either distributed or central solar PV are primarily associated with the manufacturing process. Several different materials can be used to manufacture solar PV panels, and some are toxic, hazardous, flammable and explosive. The potential for adverse air quality impacts can be reduced by careful transport, storage, use and disposal of dangerous materials. The impacts during manufacturing are the highest if there is a release of the materials. Impacts

can be characterized as low overall. Complying with all applicable air quality laws and permit requirements as well as having accident prevention and response plans can reduce chance and impacts of release.

There may be air quality impacts during construction of the facilities on a site, including fugitive dust and vehicle exhaust. Central solar installations require a significant amount of land, so disturbance to soil could result in more significant impacts than distributed systems, which are usually installed on or near existing structures. The impacts can be mitigated by controlling fugitive dust and minimizing soil disturbance.

There are no air quality impacts during the operation of the solar PV units.

5.2.2 Surface and Groundwater

The greatest impact to surface and groundwater of solar PV, both central and distributed, is associated with the manufacturing process. High purity water is required for the production of PV materials. Hazardous materials used in the manufacturing process could contaminate water, which requires careful treatment before release from the manufacturing facility. Disposal of the hazardous materials could also result in contamination of groundwater. Proper use and disposal of hazardous materials, and compliance with all applicable laws and regulations, minimizes and avoids impacts.

There are almost no impacts associated with the installation and operation of central or distributed solar PV. A small amount of water may be necessary for support personnel at central stations or to wash the panels, and if the waste water is treated properly and water is conserved, impacts are minimal.

5.2.3 Soils and Geology

If solar panels are installed as a central station, they require a large amount of open land, but they use almost no open undeveloped land if they are distributed among existing residential or commercial buildings. One megawatt of solar PV energy requires approximately 45 acres (NWPPC, 1991). Depending on the site topography, some grading of the surface soils may be necessary. Impacts could be minimized through careful selection of sites that require little grading, thereby minimizing soil disturbance, and controlling erosion.

5.2.4 Plants and Animals

Some impacts to plants and animals are likely at central station solar PV installations, due to the large amount of land that is required and the high percentage of the land that is covered by the panels, blocking exposure to sun and rain. Desirable locations that receive large amounts of solar insolation are dry, and are often places with plants and animals that are sensitive to disturbance. Impacts can be minimized by avoiding sites that are home to sensitive plants and animals, and by designing panel support structures and spacing that reduces negative effects on

plants and animals. Distributed solar PV located on existing structures will have almost no additional impacts on plants and animals.

5.2.5 Land Use

Central systems will impact land use because of the large amount of undeveloped land covered by panels which cannot be used for other purposes. Impacts can be minimized by selecting sites where there are few other available land uses. There will be no impacts on land use for distributed systems on existing structures.

5.2.6 Employment

Employment will increase during installation of the solar PV panels at central sites, then drop to the number of employees necessary to maintain the facility. Employment in installation and maintenance of distributed systems may be at lower levels, but with fewer fluctuations, as utility and independent companies work over a larger customer base on much smaller projects.

5.2.7 Aesthetics and Recreation

Both central station and distributed solar PV installations may be considered to have negative aesthetic impacts. Impacts can be reduced through avoiding visually sensitive locations and by screening. Recreational use of land used for central station PV would be restricted or prohibited, negatively impacting recreation.

5.2.8 Environmental Health

There are potential environmental health impacts of solar PV manufacturing. Heavy metals and gases that are toxic, hazardous, explosion and fire hazards are used. Some materials used are identified as carcinogens, mutagens or teratogens. These materials could pose a threat to the health of workers in the manufacturing process, and accidental releases of dangerous materials into the air or water (ground or municipal waste) could impact people living and working nearby. The risks are reduced through proper storage, handling, and disposal of these materials and compliance with applicable environmental regulations.

Installation and operation hazards include the risk of electrocution. Panels produce electricity as soon as they are exposed to sunlight and must be handled carefully to avoid electric shocks. Training personnel who install and maintain the panels, and limiting access to panels when they are in operation reduces risk.

5.2.9 Cultural Resources

A central solar PV facility could have an impact on cultural resources if they exist on the site. The impact could be minimized by consulting with appropriate agencies and stakeholder groups to identify sites which may have cultural resources. Based on this information, sensitive sites might be avoided or site preparation overseen by a cultural resources specialist. Careful preparation of the site and handling of any cultural artifacts found during construction will also

minimize impacts. Distributed solar PV could impact cultural resources if panels were located on an historic structure, and such locations should be avoided.

5.2.10 Energy Resources

Both central and distributed solar PV installations would produce electricity. Some distributed systems may be independent from the distribution and transmission grid.

Solar PV would have no impact on other energy resources, except as the electricity produced would displace other sources, most likely fossil fuel.

5.3 Biomass

Figure 5-3. Potential Environmental Impacts – Biomass





Air Quality	Surface and Groundwater	Soils and Geology	Plants and Animals	Land Use	Employment	Aesthetics and Recreation	Environ. Health, Including Noise	Cultural and Historical Resources	Energy Resources
					beneficial				
MITIGATION									
Air quality permits, good combustion practices, emission control equipment, dust control	Minimize use of pesticides and fertilizers, minimize road building, spill prevention, water conservation	Erosion Control, Avoid building in undisturbed areas	Avoid building in undisturbed areas or areas with plants and animals sensitive to disturbance	Careful site selection		Careful site selection, screening	Air quality permits, low emission engines, ventilate, fire/safety training and equip.	Careful site selection	
Relative impact level:  High  High-Moderate  Moderate  Low									

Figure 5-3 shows the potential range of environmental impacts of biomass energy production, along with associated mitigation measures.

5.3.1 Air Quality

Air quality impacts from the conversion of biomass energy through combustion engine include the production of particulates, oxides of nitrogen, carbon monoxide, carbon dioxide, and non-methane hydrocarbons. The amount of emission depends on the type of engine and the fuel used. During construction, air emissions could include fugitive dust and vehicle exhaust. Air quality impacts could be reduced by using good combustion practices, using particulate and other pollution control equipment, and controlling fugitive dust during construction. Meeting air quality standards also reduces air impacts. Impacts could be moderate to high-moderate.

If a fast growing, dedicated crop is used for fuel, a biomass project can be considered to have zero net CO₂ impacts. This assumes that the crop is replanted continuously so that the CO₂ that is released from combustion is sequestered in the new crop. Some biomass material would, if not used for producing energy, generate methane, a potent greenhouse gas, during decomposition.

5.3.2 Surface and Groundwater

Impacts to surface and groundwater could result from fertilizers and pesticides used to grow the biomass material, from erosion and runoff caused by the harvest and collection process, and from storing the solid waste from the combustion process. Impacts could be low to high-moderate. Water will be used in the combustion and generation of energy, and the amount of water used will depend heavily on the method used to produce fuel and the type of energy conversion equipment used. Cooling and engine fluids may pose a spill hazard. The risk of spills can be reduced by taking spill prevention measures.

5.3.3 Soils and Geology

Soil and local geology would be impacted by the construction of the energy production facility and in the growth and collection of the biomass material. The level of the impacts will vary widely depending on the site and the methods used to grow and harvest the material, and could be low to high-moderate. Removing organic material from agricultural and forest land can have a negative impact, because that material is not allowed to decay and return nutrients to the soil. Soil may be disturbed if new power lines have to be installed at the site, but the impact will be minor. Impacts could be reduced by taking erosion control measures and avoiding building on undisturbed sites.

5.3.4 Plants and Animals

Impacts on plant and animal life could result from facility construction and fuel growth and harvest methods. The level of the impacts will vary widely depending on the site and the methods used to grow and harvest the material, and could be low to high. Air and noise emissions may have a negative impact on some species. Impacts can be reduced careful site selection and by incorporating noise reduction strategies into the electricity production facilities.

5.3.5 Land Use

Land use impacts would impacts widely depending on the site and the methods used to grow and harvest the material, and could be low to high-moderate. If the biomass facility is located near the fuel source, it could be in an industrial, agricultural, or forested area. Transmission line impacts to land use would also vary with location. Fuel supply could also impact land use, for example by changing the use of agricultural land from food crop to fuel/electricity crop production. Impacts could be minimized through careful site selection.

5.3.6 Employment

Employment will increase during the construction of the biomass facility. The level of employment will depend on the size of the energy production facilities, but will be short term. It is likely that some staff would be required to operate the facility. Employment opportunities would also be provided for workers growing and gathering the fuel. This is especially important

in communities impacted by changes in forestry and farming economies, and could provide beneficial employment impacts.

5.3.7 Aesthetics and Recreation

Aesthetic and recreation impacts from biomass facilities will vary widely depending on the site and the methods used to grow and harvest the material, and could be low to moderate. If new transmission lines are required, they may have visual impacts. Visual impacts could be minimized by screening facilities and careful site selection.

5.3.8 Environmental Health

Environmental health issues associated with biomass energy facilities include air impacts, noise impacts, and fire hazard from combustion of biomass fuel. Occupational injury hazards are typically high for agriculture and forestry industry methods of growing and gathering the fuel. Impacts will vary widely with location and methods of fuel production, gathering, and combustion. Impacts could be reduced by enforcing safe work practices.

Air quality impacts would be limited by using good combustion practices, using particulate and other pollution control equipment, and controlling fugitive dust during construction.

Proper ventilation and fire suppression equipment and training for facility operators, would reduce explosion and fire hazard. Public access to the facility should be limited.

Noise impacts could be reduced by using modern generators, and housing parts of the system in buildings with noise suppression features. Overall, environmental health impacts of a biomass energy facility could be moderate to high-moderate.

5.3.9 Cultural Resources

Cultural resource impacts from biomass facilities will vary widely depending on the site and the methods used to grow and harvest the material and could be low to moderate. If undisturbed areas are used for the facility, cultural resources could be encountered during construction, but the impact could be minimized by consulting with appropriate agencies and stakeholder groups to identify sites which may have cultural resources. Based on this information, sensitive sites might be avoided, or site preparation overseen by a cultural resources specialist to mitigate or avoid impacts. Careful preparation of the site and handling of any cultural artifacts found during construction will also minimize impacts.

5.3.10 Energy Resources

The biomass energy facility would be a producer of electricity, and in some cases would use an energy resource that would otherwise be taken to a landfill or allowed to decay. It would have no impact on other energy resources, except as the electricity produced would displace other sources, most likely fossil fuels.

6.0 CENTRALIA UPDATE

In Section 8.4.2.1 in the SRA FEIS several issues related to SCL's 8% share of the Centralia coal plant were discussed. These included the possible sale or loss of SCL's share of the Centralia Coal plant, the anticipated Reasonably Available Control Technology (RACT) Order which would limit air pollution emissions from the plant, and a study of the health impacts of emissions from the plant.

An update to each of these issues is given below. This additional information does not substantially change the analysis of significant impacts and alternatives in 1997 SRA EIS. The release of the health study was anticipated in the EIS. The RACT Order was also anticipated in the EIS, and the impact of this order will be at the level stated in the EIS. In the case of the sale, the SRA FEIS concluded that "the sale of Centralia would have a relatively minor effect on its pattern of generation and corresponding environmental impacts" (page 8-20).

6.1 Health Study

The health study of impacts of Centralia emissions, "An Assessment of the Health Risks Due to Air Emissions from the Centralia Power Plant", was released November 12, 1997.

The study was performed in two parts. First, an air pollution analysis of Centralia emissions was conducted by McCulley, Frick and Gilman. The air pollution model was used to project exposure to Centralia emissions for the 5.5 million people living within a 150 mile radius of the plant. Based on the pollution levels and population distribution, the health risk assessment analysis was performed by a team led by Jonathan M. Samet of Johns Hopkins University School of Public Health. The health risk assessment was based on studies that linked cardiopulmonary mortality, hospitalizations in the elderly, and emergency room and outpatient visits for asthma. Peer reviewers evaluated the study.

The risk assessment estimated that installation of pollution control equipment at the plant would reduce premature mortality in the area due to the plant from 3 to 34 per year, to 1 to 13 per year.

The study concluded that "In the context of general air pollution, compared to other exposures from all sources of air pollution, the Centralia plant is a minor contributor to population exposures and to projected health risks of air pollution even with no scrubbers and this estimated contribution is substantially reduced by the addition of such pollution controls." ("An Assessment of the Health Risks Due to Air Emissions from the Centralia Power Plant," Jonathan Samet, et al, Nov. 12, 1997, page 8.)

6.2 RACT

The Southwest Air Pollution Control Agency (SWAPCA) issued a Final Reasonably Available Control Technology (RACT) Order in February, 1998. The Order was based on the Collaborative Decision Making solution reached by the plant owners, federal land management agencies, and air quality agencies.

The RACT Order established a limit of 10,000 tons of sulfur dioxide and an annual average limit on oxides of nitrogen of 0.30 lb/Mbtu or 0.35 lb/Mbtu, depending on operating levels, both beginning January 1, 2003. Project milestones towards progress installing the control equipment are also included in the Order.

6.3 Sale of the Centralia Plant and Centralia Mining Company Mine

In 1998, the Centralia Owners agreed to attempt to sell both Centralia Plant and Mine. The process included providing prospective buyers with information about the Plant's environmental compliance requirements and record, as well as the new RACT Order. In May, 1999, the owners agreed to sell the plant and mine to TransAlta, a Canadian electricity company that currently owns and operates hydroelectric plants, three coal-fired plants, and two coal mines. The sale was approved by the utilities and state regulators, and closed May 7, 2000. SCL's right to receive energy from Centralia expired 5 days later. SCL will purchase market energy to fill the resource gap temporarily until the SRA 2000 SRA has been reviewed and new resources are acquired.

The RACT Order must be met on schedule, regardless of the plant sale or who the owner is.

As a condition of the sale, TransAlta required that the sellers continue progress toward meeting the RACT Order and remain in compliance with RACT milestones. On May 20, 1999, TransAlta, PacifiCorp on behalf of the Owners, and ABB/Stone & Webster Engineering Consortium signed a contract for design and installation of sulfur dioxide emission controls. A separate contract for controls for oxides of nitrogen will be signed between TransAlta and ABB/Stone & Webster.

7.0 CONCLUSION

The 2000 SRA includes analysis of issues that were addressed in 1997 SRA EIS. For the most part, the updated recommendations were covered in the 1997 SRA EIS in enough detail that additional analysis was not required, including BPA purchases, acquisition of a natural gas-fired resource, conservation/load management, and individual resources such as wind, small hydro, geothermal, and fuel cells. Other resources, landfill and wastewater treatment gas, biomass, and solar PV, required additional analysis in this addendum, but this additional information did not substantially change the conclusions about the level of impacts and alternatives in the 1997 SRA EIS. SCL has determined that the new information described in this addendum does not involve any probable significant adverse impacts that are beyond the range of alternatives and impacts discussed in the Final EIS. Therefore, this addendum, along with the original EIS, satisfies the SEPA requirements for the 2000 SRA.

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